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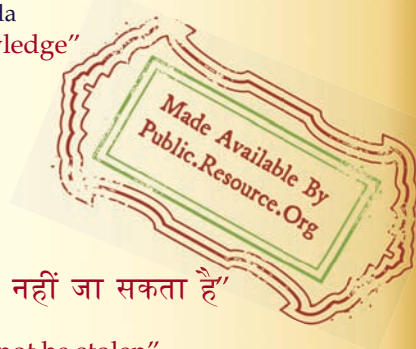
IS 2449 (1963): Silver oxide [CHD 1: Inorganic Chemicals]



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IS : 2449 - 1963

Indian Standard
**SPECIFICATION FOR
SILVER OXIDE**

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 MATHURA ROAD
NEW DELHI 110002

August 1963

AMENDMENT NO 1 FEBRUARY, 1981
TO
IS:2449-1963 SPECIFICATION FOR SILVER OXIDE

Corrigendum

(Page 7, clause A-6.1.1) - Substitute the
following for the existing clause:

'A-6.1.1 Dilute Hydrochloric Acid'

(CDC 3)

Reprography Unit, ISI, New Delhi, India

Indian Standard

SPECIFICATION FOR SILVER OXIDE

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Indian Standard
SPECIFICATION FOR
SILVER OXIDE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 14 June 1963, after the draft finalized by the Fine Chemicals (Organic & Inorganic) Sectional Committee had been approved by the Chemical Division Council.

0.2 The production of silvered mica plates has been firmly established in the country and silver oxide is an important raw material for this industry. This standard is intended to assist the indigenous manufacturers of silver oxide in producing a material of the required quality.

0.3 Wherever a reference to any Indian Standard appears in this specification, it shall be taken as a reference to the latest version of the standard.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960 Rules for Rounding Off Numerical Values (*Revised*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

0.5 This standard is intended chiefly to cover the technical provisions relating to silver oxide, and it does not include all the necessary provisions of a contract.

1. SCOPE

1.1 This standard lays down requirements and methods of sampling and test for silver oxide. The material is used in the production of silvered mica plates in the manufacture of capacitors for electronics industry.

2. REQUIREMENTS

2.1 Description — The material shall be dark brown in colour, and shall be free from dirt, reduced silver and other gritty matter.

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2.2 Particle Size — The material shall completely pass through 63-micron IS Sieve.

NOTE — BS Sieve 240, ASTM Sieve 230 and Tyler Sieve 250 have their apertures within the limits specified for the IS test sieve mentioned above and may, therefore, be used as 03-micron IS Sieve.

2.3 The material shall also comply with the requirements prescribed in Table I when tested according to the methods given in Appendix A. Reference to the relevant clauses of Appendix A is given in col 4 of the table.

TABLE I REQUIREMENTS FOR SILVER OXIDE

SL No.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST (REF TO CL No. IN APPENDIX A)
(1)	(2)	(3)	(4)
i)	Silver oxide (as Ag_2O), percent by weight, <i>Min</i>	99.3	A-2
ii)	Copper, lead and iron	To pass test	A-3
iii)	Sulphates (as SO_4), percent by weight, <i>Max</i>	0.005	A-4
iv)	Chlorides (as Cl), percent by weight, <i>Max</i>	0.05	A-5
v)	Nitrates (as NO_3), percent by weight, <i>Max</i>	0.01	A-6
vi)	Alkalinity (as Na_2O), percent by weight, <i>Max</i>	0.06	A-7

3. PACKING AND MARKING

3.1 Packing — The size and material of construction of the containers shall be subject to agreement between the purchaser and the supplier.

3.2 Marking — The containers shall be securely closed and marked with the name and weight of the material in the container; manufacturer's name and trade-mark, if any; batch number; and the year of manufacture.

3.2.1 The containers may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that Standard, under a well-defined system of

inspection, testing and quality control during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the Standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

4. SAMPLING

4.1 Representative samples of the material shall be drawn as prescribed in Appendix B.

APPENDIX A

(Clause 2.3)

ANALYSIS OF SILVER OXIDE

A-1. QUALITY OF REAGENTS

A-1.1 Unless specified otherwise, pure chemicals and distilled water [see IS : 1070-1960 Specification for Water, Distilled Quality (Revised)] shall be used in tests.

NOTE — 'Pure chemicals' shall mean chemicals which do not contain impurities that affect the results of analysis.

A-2. DETERMINATION OF SILVER OXIDE

A-2.1 Reagents

A-2.1.1 *Dilute Nitric Acid* — 1:1.

A-2.1.2 *Sodium Chloride Solution* — 10 percent.

A-2.2 **Procedure** — Weigh accurately about 0.15 to 0.2 g of the material, previously dried at $105^{\circ} \pm 2^{\circ}\text{C}$ for 2 hours and cooled. Dissolve in the minimum quantity of dilute nitric acid and boil to expel nitrous fumes. Dilute to about 100 ml with water. Filter off the insoluble matter and wash well with hot water. Collect the washings and the filtrate and heat to 60° to 70°C . Add sodium chloride solution slowly with constant stirring till no more precipitate of silver chloride develops. Boil for 5 minutes to coagulate the precipitate. Allow it to settle in a dark place for 5 to 6 hours. Filter the precipitate through a weighed sintered crucible No. 3 or filter paper (Whatman No. 40 or equivalent). Wash well with cold water acidified slightly with nitric acid and finally with cold water alone. Dry the precipitate in an air oven to constant weight at 130° to 150°C .

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A-2.3 Calculation

$$\text{Silver oxide (as Ag}_2\text{O) , percent by weight} = \frac{80 \cdot 83 B}{A}$$

where

B = weight in g of the precipitate, and

A = weight in g of the material taken for the test.

A-3. TEST FOR COPPER, LEAD AND IRON

A-3.1 Reagents

A-3.1.1 *Dilute Nitric Acid*— 1:1.

A-3.1.2 *Dilute Ammonium Hydroxide* — 1 : 1.

A-3.1.3 *Ammonium Molybdate Solution* — 10 percent.

A-3.2 Procedure — Dissolve 5.000 g of the material in dilute nitric acid and boil off the nitrous fumes. Dilute to 200 to 300 ml with water. Add dilute ammonium hydroxide until the precipitate which is formed just dissolves. Let it stand for three hours. The material shall be taken to have passed the test for iron if there is no brown precipitate, and for copper if the solution does not show a blue colour. To the clear solution, add 1 ml of ammonium molybdate solution. The material shall be taken to have passed the test for lead if no turbidity or precipitate is formed.

A-4. TEST FOR SULPHATES

A-4.1 Reagents

A-4.1.1 *Dilute Nitric Acid* — approximately 5 N.

A-4.1.2 *Barium Nitrate Solution* — 6 percent.

A-4.2 Procedure — Dissolve 2.000 g of the material in dilute nitric acid and boil to expel nitrous fumes. Dilute to 200 ml and add 5 ml of barium nitrate solution. Let it stand for one hour. Prepare a blank for comparison.

A-4.2.1 The material shall be considered as not having exceeded the limit prescribed in Table I if no turbidity or precipitate is produced.

A-5. TEST FOR CHLORIDES

A-5.1 Apparatus

A-5.1.1 *Nessler Tubes* — 50-ml capacity.

A-5.2 Reagents

A-5.2.1 Dilute Nitric Acid — approximately 5 N.

A-5.2.2 Standard Chloride Solution — Dissolve 1.64 g of sodium chloride, previously dried at $105^{\circ} \pm 2^{\circ}\text{C}$, in water and dilute to 1 000 ml in a volumetric flask. Further dilute 100 ml of the solution to 1 000 ml. One millilitre of the solution contains 0.1 mg of chlorides (as Cl).

A-5.2.3 Silver Nitrate Solution — 10 percent.

A-5.3 Procedure — Dissolve 0.200 g of the material in 10 ml of dilute nitric acid. Boil to expel nitrous fumes. Cool and transfer to a Nessler tube and dilute to the mark. In another Nessler tube, take 1 ml of standard chloride solution, add 10 ml of dilute nitric acid and 1 ml of silver nitrate solution. Dilute to the mark. Compare the turbidity produced in the two Nessler tubes.

A-5.3.1 The material shall be taken as not having exceeded the limit prescribed in Table I if the turbidity produced with the material is not greater than that produced in the control test.

A-6. TEST FOR NITRATES**A-6.1 Reagents**

A-6.1.1 Dilute Nitric Acid — approximately 5 N.

A-6.1.2 Standard Indigo Carmine Solution — Dissolve 0.2 g of indigo carmine in 500 ml of dilute sulphuric acid, add 20 ml of hydrochloric acid and sufficient dilute sulphuric acid to produce 1 000 ml. Standardize the solution so that 10 ml added to 3.3 ml of M/1 000 potassium nitrate solution is just decolourized on adding 13 ml of sulphuric acid and heating to boiling.

A-6.1.3 Dilute Sulphuric Acid — 5 N.

A-6.2 Procedure — Suspend 1.000 g of the material in 10 ml of water, mix well and allow to settle. Take the supernatant clear liquid, add 0.5 ml of standard indigo carmine solution and 5 ml of dilute sulphuric acid and heat to boiling.

A-6.2.1 The limit prescribed shall be taken as not having been exceeded if the blue colour produced does not entirely disappear.

A-7. TEST FOR ALKALINITY**A-7.1 Reagents**

A-7.1.1 Standard Sulphuric Acid — 0.05 N.

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A-7.1.2 Phenolphthalein Indicator Solution — Dissolve 0.1 g of phenolphthalein in 60 ml of rectified spirit conforming to IS : 323-1959 Specification for Rectified Spirit (*Revised*) and dilute with water to 100 ml.

A-7.2 Procedure — Take 10.0 g of the material in a flask and add 500 ml of water. Reflux on a hot water-bath for about one hour. Filter 50 ml of the clear supernatant liquid. Add a few drops of phenolphthalein indicator solution and titrate against standard sulphuric acid.

A-7.3 Calculation

$$\text{Alkalinity (as Na}_2\text{O) , percent by weight} = \frac{31 V N}{W}$$

where

V = volume in ml of standard sulphuric acid used,

N = normality of standard sulphuric acid, and

W = weight in g of the material taken for the test.

APPENDIX B

(*Clause 4.1*)

SAMPLING OF SILVER OXIDE

B-1. GENERAL REQUIREMENTS OF SAMPLING

B-1.0 In drawing, preparing, storing and handling samples, the following precautions and directions shall be observed.

B-1.1 Samples shall be taken in a protected place.

B-1.2 The sampling instrument shall be clean and dry.

B-1.3 Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from adventitious contamination.

B-1.4 To draw a representative sample, the contents of each container selected for sampling shall be mixed as thoroughly as possible by suitable means.

B-1.5 The samples shall be placed in suitable, clean, dry and air-tight glass bottles or other suitable containers on which the material has no action.

B-1.6 The sample containers shall be of such a size that they are almost completely filled by the sample.

B-1.7 Each sample container shall be sealed air-tight after filling, and marked with full details of sampling.

B-2. SCALE OF SAMPLING

B-2.1 Lot — All the containers in a single consignment of the material drawn from a single batch of manufacture shall constitute a lot. If a consignment is declared or known to consist of different batches of manufacture, the containers belonging to the same batch shall be grouped together and each such group shall constitute a separate lot.

B-2.1.1 Samples shall be tested for each lot for ascertaining conformity of the material to the requirements of the specification.

B-2.2 The number of containers (n) to be selected from the lot shall depend on the size of the lot (N) and shall be in accordance with col 1 and 2 of Table II.

TABLE II NUMBER OF CONTAINERS TO BE SELECTED FOR SAMPLING

LOT SIZE	No. OF CONTAINERS TO BE SELECTED
N	n
(1)	(2)
4 to 15	3
10 „ 40	4
41 „ 65	5
66 „ 110	7
111 and above	10

NOTE — When the size of the lot is 3 or less, the number of containers to be selected and the criterion for judging the conformity of the lot to the specification shall be as agreed to between the purchaser and the supplier.

B-2.3 These containers shall be selected at random from the lot and in order to ensure the randomness of selection, the following procedure shall be adopted:

Arrange all the containers in the lot in a systematic manner and starting from any one, count them as 1, 2, 3, . . . , etc, up to r and so on, where r is the integral part of N/n . Every r th container thus counted shall be taken out.

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B-3. PREPARATION OF TEST SAMPLES AND REFEREE SAMPLE

B-3.1 From each of the containers selected according to **B-2.3**, draw, with an appropriate sampling instrument, a representative portion of the material, about 25 g.

B-3.2 Out of these portions collected from all the selected containers, equal quantity of the material (about 15 g) shall be taken and mixed thoroughly to form a composite sample. The composite sample so formed shall be divided into three equal parts, one for the purchaser, another for the supplier and the third to be used as referee sample.

B-3.3 The remaining portion of the material from each container shall be divided into three equal parts and each such part shall constitute an individual sample. One set of the individual samples shall be marked for the purchaser, another for the supplier and the third one for the referee.

B-3.4 All the individual and composite samples shall be immediately transferred to separate containers and labelled with full identification particulars.

B-3.5 The referee sample, consisting of a composite sample and a set of n individual samples shall bear the seal of both the purchaser and the supplier. These shall be kept at a place agreed to between the purchaser and the supplier to be used in case of a dispute between the two.

B-4. NUMBER OF TESTS

B-4.1 Tests for the determination of silver oxide shall be conducted on each of the individual samples separately.

B-4.2 Tests for the determination of all other characteristics shall be conducted on the composite sample.

B-5. CRITERIA FOR CONFORMITY

B-5.0 A lot shall be declared as conforming to the requirements of this specification if the conditions given in **B-5.1** and **B-5.2** are satisfied.

B-5.1 For Individual Samples — From the individual test results for silver oxide, the mean ($\bar{x}$) and the range (R) of the test results shall be computed (range being defined as the difference between the maximum and minimum of the test results).

B-5.1.1 The value of the expression ($\bar{x} - 0.6 R$) calculated from the test results shall be greater than or equal to 99.3.

B-5.2 For Composite Sample — The test results for those characteristics which have been determined on the composite sample shall satisfy the relevant requirements given in the specification.

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